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| EXAMINER | |
|---|---|
| DANIELS, ANTHONY J | |
| ART UNIT | PAPER NUMBER |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/816,055 | QUAN, SHUXUE | |
| | Examiner | Art Unit | |
| | ANTHONY J. DANIELS | 2622 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *17 April 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-11,13-19 and 21-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13-19 and 21-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/17/2008 has been entered.

### *Response to Amendment*

1. The amendment to claim 13 has overcome the examiner's 112 rejection.

### *Response to Arguments*

1. Applicant's arguments with respect to claims 1 and 3-11 and the Tani rejection have been considered but are moot in view of the new ground(s) of rejection.

2. Applicant's arguments regarding claims 1,2,13-19,21,25-29 and 31 and the Noguchi in view of the Official Notice statement rejection have been fully considered and are persuasive. Accordingly, this rejection has been withdrawn. New grounds of rejection are being used to reject these claims. See below.

3. Applicant's arguments with respect to claims 22-24 and 32-34 have been considered but are moot in view of the new ground(s) of rejection. Specifically, Applicant argues that Vilaseca and Arai do not teach the newly added features to the independent claims. The examiner has not

relied upon Vilaseca and Arai to teach these features. Thus, these references still stand as teaching principal component analysis, Wiener estimation and independent component analysis in surface reflectance calculation.

Also, until evidence supporting a swearing behind of the Vilaseca reference is made of record, Vilaseca is submitted as prior art.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1,3,4,11,13 and 35 are rejected under 35 U.S.C. 102(e) as being anticipated by Roddy et al. (US # 7,057,654).

As to claim **1**, Roddy et al. teaches a digital imaging system (Figure 7b) comprising: a first imaging sensor (Figure 7b, area array photosensor "40"); a second imaging sensor (Figure 7b, area array photosensor "42"), the second imaging sensor coupled to the first imaging sensor (Figure 7a, two photosensors coupled by beamsplitter "36"); a first multichromatic filter coupled to the first imaging sensor (Figure 8b; Col. 6, Lines 66 and 67), wherein the first multichromatic filter transmits light at a first set of wavelengths, the first set of wavelengths corresponding to at least two imaging channels, and wherein each imaging channel transmitted through the first

multichromatic filter corresponds to a different color and the first imaging sensor senses the at least two imaging channels of the first set of wavelengths (Figure 8b, R and B); and a second multichromatic filter coupled to the second imaging sensor (Figure 8a; Col. 6, Lines 63-66), wherein the second multichromatic filter transmits the light at a second set of wavelengths, the second set of wavelengths corresponding to at least two imaging channels offset from the imaging channels of the first set of wavelengths (Figure 8a, C and G), and wherein each imaging channel transmitted through the second multichromatic filter corresponds to a color different from the other transmitted imaging channels and the second imaging sensor senses the at least two imaging channels of the second set of wavelengths (Figure 8a, Figure 8b, C and G different from R and B).

As to claim **3**, Roddy et al. teaches the digital imaging system of claim 1, wherein the first imaging sensor is a charge coupled device (CCD) or a complementary metal-oxide semiconductor (Col. 4, Lines 24 and 25).

As to claim **4**, Roddy et al. teaches the digital imaging system of claim 1, wherein the second imaging sensor is a charge coupled device (CCD) or a complementary metal-oxide semiconductor (Col. 4, Lines 24 and 25).

As to claim **11**, Roddy et al. teaches the digital imaging system of claim 1, wherein the second multichromatic filter provides for two imaging channels (Figure 8a, C and G).

As to claim **13**, Roddy et al. teaches a digital imaging apparatus (Figure 7a) comprising: a first means for capturing colorimetric information (Figure 7a, area array photosensor "40"); a second means for capturing colorimetric information (Figure 7a, area array photosensor "42"), the first means for capturing colorimetric information coupled to the second means for capturing

colorimetric information (Figure 7a, two photosensors coupled by beamsplitter "36"); a first means for multichromatic filtering coupled with the first means for capturing colorimetric information (Figure 8b; Col. 6, Lines 66 and 67), wherein the first means for multichromatic filtering to transmit light at a first set of wavelengths and the first set of wavelengths corresponds to at least two imaging channels, and wherein each imaging channel transmitted through the first means for multichromatic filtering corresponds to a different color and the first means for capturing colorimetric information senses the at least two imaging channels of the first set of wavelengths (Figure 8b, R and B); and a second means for multichromatic filtering coupled with the second means for capturing colorimetric information (Figure 8a; Col. 6, Lines 63-66), wherein the second means for multichromatic filtering to transmit the light at a second set of wavelengths, the second set of wavelengths corresponds to at least two imaging channels offset from the imaging channels of the first set of wavelengths (Figure 8a, C and G), and wherein each imaging channel transmitted through the second means for multichromatic filtering corresponds to a color different from the other transmitted imaging channels and the second means for capturing colorimetric information senses the at least two imaging channels of the second set of wavelengths (Figure 8a, Figure 8b, C and G different from R and B).

As to claim **35**, Roddy et al. teaches the digital imaging system of claim 1, wherein the first set of wavelengths includes one imaging channel each corresponding to colors red and blue (Figure 8b, R and B) and the second set of wavelengths includes one imaging channel corresponding to a color that is less than blue wavelengths (Figure 8a, G is lesser in frequency than the blue wavelengths), one imaging channel corresponding to a color that is in between red and blue wavelengths (Figure 8a, G is between R and B on the color spectrum), and one imaging

channel corresponding to a color that is above red wavelengths (Figure 8a, C is higher in frequency than red wavelengths).

2. Claims 1,5 and 6 rejected under 35 U.S.C. 102(b) as being anticipated by Jang (US # 6,373,523).

As to claim **1**, Jang teaches a digital imaging system (Figure 2) comprising: a first imaging sensor (Figure 2, CCD "30"); a second imaging sensor (Figure 2, CCD "31"), the second imaging sensor coupled to the first imaging sensor (Figure 2, CCDs coupled by prism "20"); a first multichromatic filter coupled to the first imaging sensor (Figure 4A), wherein the first multichromatic filter transmits light at a first set of wavelengths, the first set of wavelengths corresponding to at least two imaging channels, and wherein each imaging channel transmitted through the first multichromatic filter corresponds to a different color and the first imaging sensor senses the at least two imaging channels of the first set of wavelengths (Figure 4A, G and Cy); and a second multichromatic filter coupled to the second imaging sensor (Figure 4B), wherein the second multichromatic filter transmits the light at a second set of wavelengths, the second set of wavelengths corresponding to at least two imaging channels offset from the imaging channels of the first set of wavelengths (Figure 4B, Mg and Ye), and wherein each imaging channel transmitted through the second multichromatic filter corresponds to a color different from the other transmitted imaging channels and the second imaging sensor senses the at least two imaging channels of the second set of wavelengths (Figure 4A, Figure 4B, G and Cy different from Mg and Ye).

As to claim **5**, Jang teaches the digital imaging system of claim 1, wherein the first multichromatic filter is a trichromatic filter (Figure 4A, Mg, Cy and G).

As to claim **6**, Jang teaches the digital imaging system of claim 1, wherein the second multichromatic filter is a trichromatic filter (Figure 4B, Mg, G and Ye).

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy et al. (US # 7,057,654).

As to claims **7-10**, Roddy et al. teaches the digital imaging system of claim 1. However, the examiner takes **Official Notice** that the providing color filters having RGB (3 colors) or Cy, Mg, Ye and G (4 colors) on image sensors is well known and expected in the art. One of ordinary skill in the art would have been motivated to place either or both of these color filter arrays on either or both of the photosensors "40" and "42" in Roddy et al., because an artisan of ordinary skill in the art would recognize that would allow for an expanded color gamut, thereby providing a more pleasing image when input to a projector mechanism or a printing device (see Roddy et al., Col. 4, Lines 4-9).

2. Claims 2,14-19,21,25-29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy et al. (US # 7,057,654) in view of Noguchi (US # 6,885,394).

As to claim **2**, Roddy et al. teaches the digital imaging system of claim 1. The claim differs from Roddy et al. in that it further requires a processor that calculates a surface reflectance of an object based on the first set of wavelengths and the second set of wavelengths.

As to claim **14**, Roddy et al. teaches the digital imaging apparatus of claim 13. The claim differs from Roddy et al. in that it further requires a means for processing to calculate a surface reflectance of an object based on the first set of wavelengths and the second set of wavelengths, the means for processing coupled with the first means for capturing colorimetric information and the second means for capturing colorimetric information.

In the same field of endeavor, Noguchi teaches an apparatus for outputting a multi-band image having an image sensor that senses at least four separate wavelengths of light (Figure 2, Col. 6, Lines 26-33). The signals representative of these wavelengths is input to a processor that is coupled to the image sensor (Figure 4, image output unit "14"). The processor performs surface reflectance calculation based on either chromaticity reproduction or waveform reproduction (Col. 6, Line 54 – Col. 7, Line 11). In light of the teaching of Noguchi, it would have been obvious to one of ordinary skill in the art to include the processor of Noguchi in the system of Roddy et al. to calculate the surface reflectance of the RGBC, because an artisan of ordinary skill in the art would recognize that this would that this would allow the increase the degree of coincidence between the original image and the duplicate image by deciding the proper surface reflectance reproduction process (see Noguchi, Col. 1, Lines 41-67).

As to claim **15**, Roddy et al. teaches a method comprising: receiving a first set of wavelengths of light at a first sensor via a first multichromatic filter, the first set of wavelengths corresponding to at least two imaging channels and wherein each imaging channel transmitted through the first multichromatic filter corresponds to a different color and; receiving a second set of wavelengths of the light at a second sensor via a second multichromatic filter, the second set of wavelengths corresponding to at least two imaging channels offset from the imaging channels of the first set of wavelengths and wherein each imaging channel transmitted through the second multichromatic filter corresponds to a color different from the other transmitted imaging channels (For all features, see Figures 7a, 8a, 8b and column 6, lines 61-67 of Roddy et al.). Although it is not stated explicitly in Roddy et al., the examiner takes **Official Notice** that providing a digital control unit operating on instructions from a machine-readable medium is well known and expected in the art. One of ordinary skill would have been motivated to include such a control unit in the system of Roddy et al., because this would allow for quick, cost effective operation of imaging. The claim differs from Roddy et al. in that it further requires the step of processing the first set of wavelengths and the second set of wavelengths to calculate a surface reflectance of an object.

In the same field of endeavor, Noguchi teaches an apparatus for outputting a multi-band image having an image sensor that senses at least four separate wavelengths of light (Figure 2, Col. 6, Lines 26-33). The signals representative of these wavelengths is input to a processor that is coupled to the image sensor (Figure 4, image output unit "14"). The processor performs surface reflectance calculation based on either chromaticity reproduction or waveform reproduction (Col. 6, Line 54 – Col. 7, Line 11). In light of the teaching of Noguchi, it would

have been obvious to one of ordinary skill in the art to include the processor of Noguchi in the system of Roddy et al. to calculate the surface reflectance of the RGBC, because an artisan of ordinary skill in the art would recognize that this would that this would allow the increase the degree of coincidence between the original image and the duplicate image by deciding the proper surface reflectance reproduction process (see Noguchi, Col. 1, Lines 41-67).

As to claims **16-19**, Roddy et al., as modified by Noguchi, teaches the machine-readable medium of claim 15. However, the examiner takes **Official Notice** that the providing color filters having RGB (3 colors) or Cy, Mg, Ye and G (4 colors) on image sensors is well known and expected in the art. One of ordinary skill in the art would have been motivated to place either or both of these color filter arrays on either or both of the photosensors "40" and "42" in Roddy et al., because an artisan of ordinary skill in the art would recognize that would allow for an expanded color gamut, thereby providing a more pleasing image when input to a projector mechanism or a printing device (see Roddy et al., Col. 4, Lines 4-9).

As to claim **21**, Roddy et al., as modified by Noguchi, teaches The machine-readable medium of claim 15, wherein the second set of wavelengths provides two imaging channels (see Roddy et al., Figure 8a, C and G).

As to claims **25-29** and **31**, claims 25-29 and 31 are method claims corresponding to the apparatus claims 15-19 and 21, respectively. Therefore, claims 25-29 and 31 are analyzed and rejected as previously discussed with respect to claims 15-19 and 21, respectively.

3. Claims 22,24,32 and 34 rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy et al. (US # 7,057,654) in view of Noguchi (US # 6,885,394) and further in view of Vilaseca et al. (see attached NPL).

As to claims **22** and **24**, Roddy et al., as modified by Noguchi, teaches the machine-readable medium of claim 15. The claims differ from Roddy et al., as modified by Noguchi, in that they further require that the calculation of the surface reflectance include performing principal component analysis and Wiener estimation.

In the same field of endeavor, Vilaseca teaches an estimation of spectral reflectance wherein Wiener inverse estimation and principal component analysis is used to calculate spectral reflectance (p. 1789, 2nd paragraph). In light of the teaching of Vilaseca, it would have been obvious to include these estimation algorithms in the calculation of spectral reflectance in the system of Noguchi, because an artisan of ordinary skill in the art would recognize that this would allow for an efficient way to achieve reproduced color.

As to claims **32** and **34**, claims 32 and 34 are method claims corresponding to the apparatus claims 22 and 24, respectively. Therefore, claims 32 and 34 are analyzed and rejected as previously discussed with respect to claims 22 and 24, respectively.

4. Claims 23 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy et al. (US # 7,057,654) in view of Noguchi (US # 6,885,394) and further in view of Arai (US # 5,864,834).

As to claim **23**, Roddy et al., as modified by Noguchi, teaches the machine-readable medium of claim 15. The claim differs from Roddy et al., as modified by Noguchi, in that it

further requires that the calculation of the surface reflectance include performing independent component analysis.

In the same field of endeavor, Arai teaches the use of independent analysis of illuminants to achieve spectral reflectance (Col. 2, Line 7-15). In light of the teaching of Arai, it would have been obvious to one of ordinary skill in the art to include this algorithm in the calculation of spectral reflectance in the system of Noguchi, because one of ordinary skill in the art would recognize that this would ensure that the reproduced color matches the color of the original image (see Arai, Col. 2, Lines 7-15).

As to claim **33**, claim 33 is a method claim corresponding to the apparatus claim 23. Therefore, claim 33 is analyzed and rejected as previously discussed with respect to claim 23.

***Conclusion***

1. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. DANIELS whose telephone number is (571)272-7362. The examiner can normally be reached on 8:00 A.M. - 5:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lin Ye can be reached on (571) 272-7372. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AD
6/18/2008

/Lin Ye/

Supervisory Patent Examiner, Art Unit 2622